RES 507 Human and Technological Systems
GPP 542 Science and Technology Policy
Syllabus Outline

Instructor	Office	Office Hours	Email
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Class Time and Place: 2 to 5 pm, Tuesday

Course Overview

This course introduces students to the role and influence of science and technology in society, and its relationship to public policy, human development and the environment. The influence of science and technology on public policy is bidirectional. Science and technology (S&T) is influenced by policy decisions (policy for science) and in turn influences public policy (science for policy). The course introduces students to basic models for understanding this bidirectional interaction. The approach is multidisciplinary, drawing upon literature in a wide range of fields including: economics of technological change, philosophy of science, environmental science and engineering, environmental social sciences, and social studies of science, and history of technology. We will also rely upon the extensive literature written by scientists, engineers and policy analysts in their role as policy observers and advisors. While this literature tends to draws heavily on the North American and European cases, the course will strive to incorporate concerns and cases in the developing world, and problems of poverty and inequity world wide.

Learning Outcomes:

By the end of this course, students should be able to:

- Demonstrate broad understanding of the relationships between science, technology and society;
- Articulate the differences and interconnections between science and technology;
- Describe sources of technological change and their influence on the economy, on society and the local and global environment;
- Explain how government policy, including patent protection and government funded R&D, influences the development of new technologies (including 'green' ones);
- Explain how science-policy advisory systems operate, how technology assessment is conducted, and how it can influence public policy;
- Articulate the basic concepts of public perception of science;
- Explain how social groups are active agents in technological change or resistance to technology;
- Apply course concepts and tools to analyze 'real-world' science-policy controversies.

Course Format:
The course consists of one 3-hour session each week, involving both lectures and seminar-based discussions. Lectures will highlight the basics of S&T concepts, while students will play an active role in discussing specific policy interventions during seminars. Throughout the course, readings will use specific case studies to ground theoretical models of the relationship between science and technology and public policy.

Course Requirements
This course will require that students apply concepts from a variety of disciplines. A background in a scientific or technical field is useful but not necessary. Students are expected to attend each class session, to prepare for each session by completing the weekly readings, and to participate actively and constructively in class discussions.

Evaluation Criteria and Grading
The course is graded on a numeric basis, and evaluation consists of:
      In-class activities and presentation (10%)
      Short reflections on readings (10% - 4 graded at random)
      2 Policy briefs - (2x10% = 20%)
      Quizzes (2x10% = 20%)
      Case study/Project (40%) involving:
            In-class presentation (10%)
            Written report (30%)

- The presentation and short reflections will allow students to demonstrate their understanding of course concepts and major debates within the literature.
- The policy briefs will enable students to synthesis key ideas in a succinct manner and to communicate them in a format a policymaker might demand from an analyst.
- The Group Policy Report and Case Study will allow them to integrate their emerging knowledge in addressing important "real-world" policy problems.
- The role of the two quizzes is self-evident.

In-Class Activities – 10%
Students are expected to having thoroughly read the assigned readings and prepared to participate actively in class discussions, debates and workshops. Given the interdisciplinary nature of the material, this will contribute strongly to their construction of knowledge and to the negotiation of shared understanding within the group.

Quiz:
There will be two quizzes (2X7.5% = 15%)
Due Dates: Sept 27 and October 31st

Policy Briefs (25%)

A policy brief is a short document (~1500 words) that takes various forms. It can presents the findings and recommendations of a research project to a non-specialist audience, it can be a medium for exploring an issue and distilling lessons learned from the research, or it can be vehicle for providing policy advice[1]. You will write two policy briefs on topics of your choice, at least one of which will be a brief intended for providing policy advice to a decision maker. You can find examples and suggestions for policy briefs here:

1. http://writingcenter.unc.edu/policy-briefs/
2. http://www.ids.ac.uk/publication/achieving-diverse-development-goals-how-can-different-goals-be-pursued-together
3. http://www.ids.ac.uk/publication/edible-insects-and-the-future-of-food
4. https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/policybrief34.pdf

Due Dates: Week of October 10th, November 21st and 28th

Short Reflections (10%)
Each week, each student will submit a short, one-page written response debating the key ideas and/or questions arising from that week's readings. These written responses will ensure that the students complete the readings in a timely manner, as well provide a rapid evaluation of progress in understanding and articulating course concepts. There will be eight such Critical Reflections over the course of the term of these four will be graded at random.

Case Study (Total 40%: Presentation 10%, Written Report: Total 30% - 20% individual, 10% group)

Final Written Reports due December 7th
Presentations:

Student will work in groups to select a science and technology topic with which to apply and integrate the tools and knowledge acquired through the term. The work will could involve an in-depth examination of a specific science and technology policy domain determined by the group in consultation with the instructor. The project could include: an in-depth assessment of a specific-science policy domain; a study that assesses the effects of specific technologies and examines policy remedies; an analysis of a science-policy controversy from the perspective of different stakeholders. Each group will make a brief (30 minute) presentation of their case in-class at the end of term, after which each student will submit an individual written report. The Case Study contributes a total of 40% to each student's course grade – 10% from the presentation and 30% from the written report.

The projects will be judged on a) the quality of their description of the science and technology policy case b) the depth of the analysis (specific criteria above), c) the depth and quality of the integration of tools and knowledge from the course and d) the overall presentation quality.

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[1] This is the IDRC's (now Global Affairs Canada) definition.

Case studies will be presented and are due the last two weeks of class (students will sign up for a specific presentation/due date).

Course Schedule

Week #	Topics	Readings
Week 1 9/5/2017	Course Overview and Introduction. Technology Trends and Emerging Challenges: Are we entering a period of 'Science Denial'?	
Week 2 9/12/2017	Sources of Technological Change: Science, Technology and Innovation	Mokyr (2002); Grubler (2000a); Calpinto (2014); *Gordon (2012)*
Week 3 9/19/2017	Science, Technology and Innovation: What role do governments play?	Jones (2011); Madrick (2014) Jaffe and Jones (2011)
Week 4 9/26/2017	Technology and Development	Kammen & Dove (1997); Toyama (2012); Aker (2012) Pingali (2012) **Quiz 1**
Week 5 10/3/2017	Intellectual Property	Stiglitz (2008); Stiglitz (2013) Caulfield et al (2006); Kesselheim (2013); Horner (2013)
Week 6 10/10/2017	Technology and Global Change The Future of Technology (Case: Robotics and AI)	Autor (2015); Halpern (2015); Lanchester (2015);
Week 7 10/17/2017	Risk Assessment (1): Defining and Meauring Risk	Kammen and Hassenzahl (2000); Morgan (1981) **Liu et al. 2013** **TBA**
Week 8 10/24/2017	Public Perception of Risks (I): 6 Logics – Gender, Race, Politics, Trust, Affect and Intution	Slovic (1987); Slovic (2004); Kahan (2010) Leach (2007)

Week #	Topics	Readings
Week 9 10/31/2017	Public Perception of Risks (II) Cases: Transgenics Climate Change, Fracking	**Transgenics:** Herring (2008) Zilberman (2013) **Climate Change** Kahan et al (2012) **Fracking-TBA** **Quiz 2**
Week 10 11/7/2017	Managing risk: A Fine Balance or Opposing Views and Unpopular Policy Choices	Pidgeon and Fischhoff (2015) Slovic and Gregory (1999) Tengs et al 1995 Graham et al (2004)
Week 11 11/14/2017	Expertise and Public Engagement: Science-Policy Advisory Systems, The Deliberative Turn	Pielke Jr. (2009) Jasanoff (2010) Willsdon and Willis (2004) Scheufele (2014)
Week 12 11/21/2017	Group Presentations	
Week 13 11/28/2017	Group Presentations	

Reading List Very Much in Flux/undergoing revisions

Auerswald, Philip, and Lewis M. Branscomb (2008) "Research and Innovation in a Networked World." *Technology in Society*, China, India, and the United States, 30, no. 3–4 (August 2008): 339–47. doi:10.1016/j.techsoc.2008.04.021.

Autor David, H. "Why are there still so many jobs? The history and future of workplace automation." *The Journal of Economic Perspectives* 29.3 (2015): 3-30.

Calpinto, J (2014) "Material Question." *The New Yorker*. Accessed September 15, 2016. http://www.newyorker.com/magazine/2014/12/22/material-question.

Grubler, A. 2000a *Technology and Global Change*. Cambridge, UK: Cambridge University Press. Chapter 2.

Halpern (2015) How Robots & Algorithms Are Taking Over | The New York Review of Books." Accessed October 1, 2016. http://www.nybooks.com/articles/2015/04/02/how-robots-algorithms-are-taking-over/.

Herring, Ronald J. "Opposition to Transgenic Technologies: Ideology, Interests and Collective Action Frames." *Nature Reviews Genetics* 9, no. 6 (2008): 458–63.

Jaffe and Jones (2011) -

Jones (2011) -

Kahan, Dan M., Ellen Peters, Maggie Wittlin, Paul Slovic, Lisa Larrimore Ouellette, Donald Braman, and Gregory Mandel. "The Polarizing Impact of Science Literacy and Numeracy on Perceived Climate Change Risks." *Nature Climate Change* 2, no. 10 (October 2012): 732–35. doi:10.1038/nclimate1547.

Kammen, D., and M. Dove. 1997. Virtues of Mundane Science. *Environment*, vol. 39, pp. 10-17. https://rael.berkeley.edu/wp-content/uploads/2015/04/Kammen-Dove-Mundane_Science_Environment_1998.pdf

Lanchester, John. "The Robots Are Coming." *London Review of Books*, March 5, 2015.

Merton, Robert K. *The Sociology of Science: Theoretical and Empirical Investigations*. University of Chicago press, 1973.

Mokyr, J. 2002. Innovation in an Historical Perspective: Tales of Technology and Evolution. In *,* Steil et al. (Eds.), *Technological Innovation and Economic Performance*. Princeton, NJ: Princeton University Press. pp. 23-46.

NAS. 2009. *Science and Decisions: Advancing Risk Assessment*. National Academy of Sciences Press. Chapters 2 and 3.

Pidgeon, Nick, and Baruch Fischhoff. "The Role of Social and Decision Sciences in Communicating Uncertain Climate Risks." *Nature Climate Change* 1, no. 1 (2011): 35–41.

Pingali, Prabhu L. "Green Revolution: Impacts, Limits, and the Path Ahead." *Proceedings of the National Academy of Sciences* 109, no. 31 (2012): 12302–8. http://www.pnas.org/content/109/31/12302.full

Pielke, Roger A. "Science Policy: Policy, Politics and Perspective." *Nature* 416, no. 6879 (March 28, 2002): 367–68. doi:10.1038/416367a. http://www.nature.com/nature/journal/v416/n6879/full/416367a.html

Slovic (1987) Perception of risk, Science. 1987 Apr 17;236(4799):280-5. http://perma-archives.org/warc/6JJJ-ZMYJ/id_/file:/6JJJ-ZMYJ/cap.pdf (For a review see http://scienceblogs.com/thepumphandle/2013/01/16/how-do-we-perceive-risk-paul-slovics-landmark-analysis-2/)

Slovic, P (1999) Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. *Risk Anal.* **19**, 689–701 (1999)
http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.1999.tb00439.x/pdf

Slovic, P. 2000a. The Perception of Risk. In *The Perception of Risk.* London: Earthscan.

Toyama (2012) "Can Technology End Poverty? | Boston Review." Accessed October 24, 2015. http://www.bostonreview.net/forum/can-technology-end-poverty.

Stiglitz. J (2013) "How Intellectual Property Reinforces Inequality - The New York Times." Accessed October 9, 2015. http://opinionator.blogs.nytimes.com/2013/07/14/how-intellectual-property-reinforces-inequality/?_r=0.

Video Material:

AI/Robotics: Why We Will Rely on Robots – Rodney Brooks
https://youtu.be/nA-J0510Pxs
Science and Trust: Naomi Oreskes.
https://www.youtube.com/watch?v=RxyQNEVOElU
End of Growth: Robert Gordon.
https://www.youtube.com/watch?v=gDmX0fG0so4
Has innovation peaked: Joel Mokyr.
https://www.youtube.com/watch?v=h5x3rdD0tSU
The Long Tail: Chris Anderson
http://www.ted.com/talks/chris_anderson_of_wired_on_tech_s_long_tail?language=en

Academic Integrity
The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.
A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at
http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0.

Access & Diversity:
Access & Diversity works with the university to create an inclusive living and learning environment in which all students can thrive. The university accommodates students with disabilities who have registered with the Access & Diversity unit: [http://www.students.ubc.ca/access/drc.cfm]. Students must register with the Disability Resource Centre to be granted special accommodations for any on-going conditions.

Religious Accommodation:
The university accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled tests and examinations. Students should let their instructor know in advance, preferably in the first week of class, if they will require any accommodation on these grounds. Students who plan to be absent for varsity athletics, family obligations, or other similar commitments, cannot assume they will be accommodated, and should discuss their commitments with the instructor before the course drop date. UBC policy on Religious Holidays: http://www.universitycounsel.ubc.ca/policies/policy65.pdf

UBC Statement on Respectful Environment for Students, Faculty and Staff
The University of British Columbia envisions a climate in which students, faculty and staff are provided with the best possible conditions for learning, researching and working, including an environment that is dedicated to excellence, equity and mutual respect. The University of British Columbia strives to realize this vision by establishing employment and educational practices that respect the dignity of individuals and make it possible for everyone to live, work, and study in a positive and supportive environment, free from harmful behaviours such as bullying and harassment.